

## **LISTING OF THE CLAIMS**

Following is a listing of claims in the application:

What is claimed is:

1           1.       (Original) A monitor that can detect a plurality of trace molecules, comprising:  
2           a housing with an ionizing chamber that is approximately at one atmosphere;  
3           a photoionizer that is coupled to said ionizing chamber;  
4           an electrospray ionizer coupled to said ionizing chamber;  
5           a switch that controls the operation of said photoionizer and said electrospray ionizer to  
6 control different modes of operation; and,  
7           a detector that is coupled to said ionizing chamber.

1           2.       (Original) The monitor of claim 1, wherein said electrospray ionizer includes a  
2 vaporizer.

1           3.       (Original) The monitor of claim 1, further comprising a chemical ionizer coupled  
2 to said ionizing chamber and said switch.

1           4.       (Original) The monitor of claim 3, wherein said chemical ionizer includes a  
2 vaporizer.

1           5.       (Original) The monitor of claim 2, further comprising a vacuum interface  
2 coupled to said ionizing chamber and said detector, said vacuum interface having an entrance  
3 that is orthogonal to said electrospray ionizer vaporizer.

1           6.       (Original) The monitor of claim 4, further comprising a vacuum interface  
2 coupled to said ionizing chamber and said detector, said vacuum interface having an entrance  
3 that is orthogonal to said electrospray ionizer vaporizer.

1           7.       (Original) The monitor of claim 1, further comprising a processor that controls  
2 said switch.

3           8.       (Original) The monitor of claim 1, wherein said switch operates in a mode where  
4 said electrospray ionizer and said photoionizer are sequentially activated.

1           9.       (Original) The monitor of claim 1, wherein said switch operates in a mode  
2 where said electrospray ionizer and said photoionizer are simultaneously activated.

1           10.      (Original) The monitor of claim 8, wherein said switch operates in a mode  
2 wherein said electrospray ionizer and said photoionizer each generates a positive ion, then each  
3 generates a negative ion.

1           11.      (Original) The monitor of claim 8, wherein said switch operates in a mode  
2 wherein said electrospray ionizer and said photoionizer each generates pairs of positive and  
3 negative ions sequentially in time.

1           12.     (Original) The monitor of claim 1, wherein said switch operates in a mode where  
2     said photoionizer is on and said electrospray ionizer is switched between on and off states.

1           13.     (Original) The monitor of claim 1, wherein said switch operates in a mode  
2     wherein said electrospray ionizer is on and said photoionizer is switched between on and off  
3     states.

1           14.     (Original) The monitor of claim 1, wherein said electrospray ionizer and said  
2     photoionizer each have an electrode that is supplied a voltage from a same voltage source.

1           15.     (Original) The monitor of claim 9, further comprising a chemical ionizer that is  
2     coupled to said switch and generates a positive ion sequentially with said electrospray ionizer  
3     and said photoionizer, and then generates a negative ion sequentially with said electrospray  
4     ionizer and said photoionizer.

1           16.     (Original) The monitor of claim 10, further comprising a chemical ionizer that is  
2     coupled to said switch and generates a positive and negative ion pair sequentially with said  
3     electrospray ionizer and said photoionizer.

1           17.     (Original) The monitor of claim 1, further comprising a valve that controls a  
2     flow of a sample through an inlet of said electrospray ionizer and an inlet of said photoionizer.

1           18.     (Original) The monitor of claim 17, wherein said valve sequentially allows the  
2 sample to flow through said electrospray ionizer inlet and said photoionizer inlet.

1           19.     (Original) The monitor of claim 17, wherein said valve simultaneously allows  
2 the sample to flow through said electrospray ionizer inlet and said photoionizer inlet.

1           20.     (Original) The monitor of claim 17, wherein said valve creates different flow  
2 rates through said electrospray ionizer inlet and said photoionizer inlet.

1           21.     (Original) A monitor that can detect a plurality of trace molecules, comprising:  
2 a housing with an ionizing chamber that is approximately at one atmosphere;  
3 a photoionizer that is coupled to said ionizing chamber;  
4 an electrospray ionizer coupled to said ionizing chamber;  
5 switch means for controlling the operation of said photoionizer and said electrospray  
6 ionizer to control different modes of operation; and,  
7 a detector that is coupled to said ionizing chamber.

1           22.     (Original) The monitor of claim 21, wherein said electrospray ionizer includes a  
2 vaporizer.

1           23.     (Original) The monitor of claim 21, further comprising a chemical ionizer  
2 coupled to said ionizing chamber and said switch means.

1           24.   (Original)   The monitor of claim 23, wherein said chemical ionizer includes a  
2   vaporizer.

1           25.   (Original)   The monitor of claim 22, further comprising a vacuum interface  
2   coupled to said ionizing chamber and said detector, said vacuum interface having an entrance  
3   that is orthogonal to said electrospray ionizer vaporizer.

1           26.   (Original)   The monitor of claim 24, further comprising a vacuum interface  
2   coupled to said ionizing chamber and said detector, said vacuum interface having an entrance  
3   that is orthogonal relative to said electrospray ionizer vaporizer.

1           27.   (Original)   The monitor of claim 21, further comprising a processor that controls  
2   said switch means.

3           28.   (Original)   The monitor of claim 21, wherein said switch means operates in a  
4   mode where said electrospray ionizer and said photoionizer are sequentially activated.

1           29.   (Original)   The monitor of claim 21, said switch means operates in a mode where  
2   said electrospray ionizer and said photoionizer are simultaneously activated.

1           30.   (Original)   The monitor of claim 28, wherein said switch means operates in a  
2   mode wherein said electrospray ionizer and said photoionizer each generates a positive ion, then  
3   each generates a negative ion.

1           31.     (Original) The monitor of claim 28, wherein said switch means operates in a  
2     mode wherein said electrospray ionizer and said photoionizer each generates pairs of positive  
3     and negative ions sequentially in time.

1           32.     (Original) The monitor of claim 21, wherein said switch means operates in a  
2     mode where said photoionizer is on and said electrospray ionizer is switched between on and off  
3     states.

1           33.     (Original) The monitor of claim 21, wherein said switch means operates in a  
2     mode wherein electrospray ionizer is on and said photoionizer is switched between on and off  
3     states.

1           34.     (Original) The monitor of claim 21, wherein said electrospray ionizer and said  
2     photoionizer each have an electrode that is supplied a voltage from a same voltage source.

1           35.     (Original) The monitor of claim 30, further comprising a chemical ionizer that is  
2     coupled to said switch means to generate a positive ion sequentially with said electrospray  
3     ionizer and said photoionizer, and then generates a negative ion sequentially with said  
4     electrospray ionizer and said photoionizer.

1           36.     (Original) The monitor of claim 30, further comprising a chemical ionizer that is  
2     coupled to said switch means to generate a positive and negative pair of ions sequentially with  
3     said electrospray ionizer and said photoionizer.

1           37.   (Original) The monitor of claim 21, further comprising a valve that controls a  
2 flow of a sample through an inlet of said electrospray ionizer and an inlet of said photoionizer.

1           38.   (Original) The monitor of claim 37, wherein said valve sequentially allows the  
2 sample to flow through said electrospray ionizer inlet and said photoionizer inlet.

1           39.   (Original) The monitor of claim 37, wherein said valve simultaneously allows  
2 the sample to flow through said electrospray ionizer inlet and said photoionizer inlet.

1           40.   (Original) The monitor of claim 37, wherein said valve creates different  
2 flowrates through said electrospray ionizer inlet and said photoionizer inlet.

1           41.   (Original) A method for detecting a plurality of trace molecules, comprising:  
2 ionizing a trace molecule with a photoionizer at approximately atmospheric pressure;  
3 ionizing a trace molecule with an electrospray ionizer at approximately atmospheric  
4 pressure;  
5 detecting the ionized trace molecules; and,  
6 switching a mode of operation of the photoionizer and the electrospray ionizer.

1           42.   (Original) The method of claim 41, further comprising vaporizing a sample that  
2 contains the trace molecules.

1           43.     (Original) The method of claim 41, further comprising ionizing a trace molecule  
2 with a chemical ionizer at approximately atmospheric pressure.

1           44.     (Original) The method of claim 41, wherein the mode includes activating the  
2 electrospray ionizer and the photoionizer sequentially.

1           45.     (Original) The method of claim 41, wherein the mode includes activating the  
2 electrospray ionizer and the photoionizer simultaneously.

1           46.     (Original) The method of claim 44, wherein the mode includes activating the  
2 electrospray ionizer and the photoionizer so that each generates a positive ion, then each  
3 generates a negative ion.

1           47.     (Original) The method of claim 44, wherein the mode includes activating the  
2 electrospray ionizer and the photoionizer so that each generates pairs of positive and negative  
3 ions sequentially in time.

1           48.     (Original) The method of claim 41, wherein the mode includes maintaining the  
2 photoionizer on, while switching the electrospray ionizer between on and off states.

1           49.     The method of claim 41, wherein the mode includes maintaining the electrospray  
2 ionizer on, while switching the photoionizer between on and off states.



1           50.     (Original) The method of claim 44, further comprising ionizing a trace molecule  
2 with a chemical ionizer in a mode where the chemical ionizer generates a positive ion  
3 sequentially with the electrospray ionizer and the photoionizer, and then generates a negative ion  
4 sequentially with the electrospray ionizer and the photoionizer.

1           51.     (Original) The method of claim 44, further comprising ionizing a trace molecule  
2 with a chemical ionizer in a mode where the chemical ionizer generates a positive and negative  
3 ion pair sequentially with the electrospray ionizer and photoionizer.

1           52.     (Original) The method of claim 41, wherein a sample with the trace molecules  
2 sequentially flows through an electrospray ionizer inlet and a photoionizer inlet.

1           53.     (Original) The method of claim 41, wherein a sample with the trace molecules  
2 simultaneously flows through an electrospray ionizer inlet and a photoionizer inlet.

1           54.     (Original) The method of claim 41, wherein a sample with the trace molecules  
2 flows through an electrospray ionizer inlet and a photoionizer inlet at different flow rates.

1           55.     (Original) A monitor that can detect a trace molecule, comprising:  
2 a housing with an ionizing chamber that is approximately at one atmosphere;  
3 a vacuum interface that is coupled to said ionizing chamber through an entrance;  
4 an electrospray ionizer that is coupled to said ionizing chamber and has a vaporizer that is  
5 orthogonal to said vacuum interface entrance; and,

6 a detector that is coupled to said vacuum interface.

1 56. (Original) The monitor of claim 55, further comprising a photoionizer coupled to  
2 said ionizing chamber.

1 57. (Original) The monitor of claim 55, further comprising a chemical ionizer that is  
2 coupled to said ionizing chamber and has a vaporizer that is orthogonal to said vacuum interface  
3 entrance.

1 58. (Original) The monitor of claim 55, further comprising a valve that controls a  
2 flow of a sample through an inlet of said electrospray ionizer and an inlet of said photoionizer.

1 59. (Original) The monitor of claim 58, wherein said valve sequentially allows the  
2 sample to flow through said electrospray ionizer inlet and said photoionizer inlet.

1 60. (Original) The monitor of claim 58, wherein said valve simultaneously allows  
2 the sample to flow through said electrospray ionizer inlet and said photoionizer inlet.

1 61. (Original) The monitor of claim 58, wherein said valve creates different flow  
2 rates through said electrospray ionizer inlet and said photoionizer inlet.

1 62. (Original) A monitor that can detect a trace molecule, comprising:  
2 a housing with an ionizing chamber that is approximately at one atmosphere;  
3 a vacuum interface that is coupled to said ionizing chamber through an entrance;

4 a chemical ionizer that is coupled to said ionizing chamber and has a vaporizer that is  
5 orthogonal to said vacuum interface entrance; and,  
6 a detector that is coupled to said vacuum chamber.

1 63. (Original) The monitor of claim 62, further comprising a photoionizer coupled to  
2 said ionizing chamber.

1 64. (Original) A monitor that can detect a plurality of trace molecules, comprising:  
2 a housing with an ionizing chamber that is approximately at one atmosphere;  
3 a photoionizer that is coupled to said ionizing chamber;  
4 a chemical ionizer coupled to said ionizing chamber;  
5 a switch that controls the operation of said photoionizer and said chemical ionizer to  
6 control different modes of operation; and,  
7 a detector that is coupled to said ionizing chamber.

1 65. (Original) The monitor of claim 64, wherein said chemical ionizer includes a  
2 vaporizer.

3 66. (Original) The monitor of claim 65, further comprising a vacuum interface  
4 coupled to said ionizing chamber and said detector, said vacuum interface having an entrance  
5 that is orthogonal to said chemical ionizer vaporizer.

1 67. (Original) The monitor of claim 64, further comprising a processor that controls  
2 said switch.

3           68.   (Original) The monitor of claim 64, wherein said switch operates in a mode  
4 where said chemical ionizer and said photoionizer are sequentially activated.

1           69.   (Original) The monitor of claim 64, wherein said switch operates in a mode  
2 where said chemical ionizer and said photoionizer are simultaneously activated.

1           70.   (Original) The monitor of claim 68, wherein said switch operates in a mode  
2 wherein said chemical ionizer and said photoionizer each generates a positive ion, then each  
3 generates a negative ion.

1           71.   (Original) The monitor of claim 68, wherein said switch operates in a mode  
2 wherein said chemical ionizer and said photoionizer each generates pairs of positive and negative  
3 ions sequentially in time.

1           72.   (Original) The monitor of claim 64, wherein said switch operates in a mode  
2 where said photoionizer is on and said chemical ionizer is switched between on and off states.

1           73.   (Original) The monitor of claim 64, wherein said switch operates in a mode  
2 wherein said chemical ionizer is on and said photoionizer is switched between on and off states.

1           74.   (Original) A monitor that can detect a plurality of trace molecules, comprising:  
2 a housing with an ionizing chamber that is approximately at one atmosphere;  
3 a photoionizer that is coupled to said ionizing chamber;  
4 a chemical ionizer coupled to said ionizing chamber;

5 switch means for controlling the operation of said photoionizer and said chemical ionizer  
6 to control different modes of operation; and,  
7 a detector that is coupled to said ionizing chamber.

1 75. (Original) The monitor of claim 74, wherein said chemical ionizer includes a  
2 vaporizer.

1 76. (Original) The monitor of claim 74, further comprising a vacuum interface  
2 coupled to said ionizing chamber and said detector, said vacuum interface having an entrance  
3 that is orthogonal to said chemical ionizer vaporizer.

1 77. (Original) The monitor of claim 74, further comprising a processor that controls  
2 said switch means.

3 78. (Original) The monitor of claim 74, wherein said switch means operates in a  
4 mode where said chemical ionizer and said photoionizer are sequentially activated.

1 79. (Original) The monitor of claim 74, said switch means operates in a mode where  
2 said chemical ionizer and said photoionizer are simultaneously activated.

1 80. (Original) The monitor of claim 78, wherein said switch means operates in a  
2 mode wherein said chemical ionizer and said photoionizer each generates a positive ion, then  
3 each generates a negative ion.

1           81.     (Original) The monitor of claim 78, wherein said switch means operates in a  
2 mode wherein said chemical ionizer and said photoionizer each generates pairs of positive and  
3 negative ions sequentially in time.

1           82.     (Original) The monitor of claim 74, wherein said switch means operates in a  
2 mode where said photoionizer is on and said chemical ionizer is switched between on and off  
3 states.

1           83.     (Original) The monitor of claim 74, wherein said switch means operates in a  
2 mode wherein chemical ionizer is on and said photoionizer is switched between on and off states.

1           84.     (Original) A method for detecting a plurality of trace molecules, comprising:  
2 ionizing a trace molecule with a photoionizer at approximately atmospheric pressure;  
3 ionizing a trace molecule with an chemical ionizer at approximately atmospheric  
4 pressure;  
5 detecting the ionized trace molecules; and,  
6 switching a mode of operation of the photoionizer and the chemical ionizer.

1           85.     (Original) The method of claim 84, further comprising vaporizing a sample that  
2 contains the trace molecules.

1           86.     (Original) The method of claim 84, wherein the mode includes activating the  
2 chemical ionizer and the photoionizer sequentially.

1           87.    (Original) The method of claim 84, wherein the mode includes activating the  
2 chemical ionizer and the photoionizer simultaneously.

1           88.    (Original) The method of claim 86, wherein the mode includes activating the  
2 chemical ionizer and the photoionizer so that each generate a positive ion, then each generate a  
3 negative ion.

1           89.    (Original) The method of claim 86, wherein the mode includes activating the  
2 chemical ionizer and the photoionizer so that each generate pairs of positive and negative ions  
3 sequentially in time.

1           90.    (Original) The method of claim 84, wherein the mode includes maintaining the  
2 photoionizer on, while switching the chemical ionizer between on and off states.

1           91.    (Original) The method of claim 84, wherein the mode includes maintaining the  
2 chemical ionizer on, while switching the photoionizer between on and off states.